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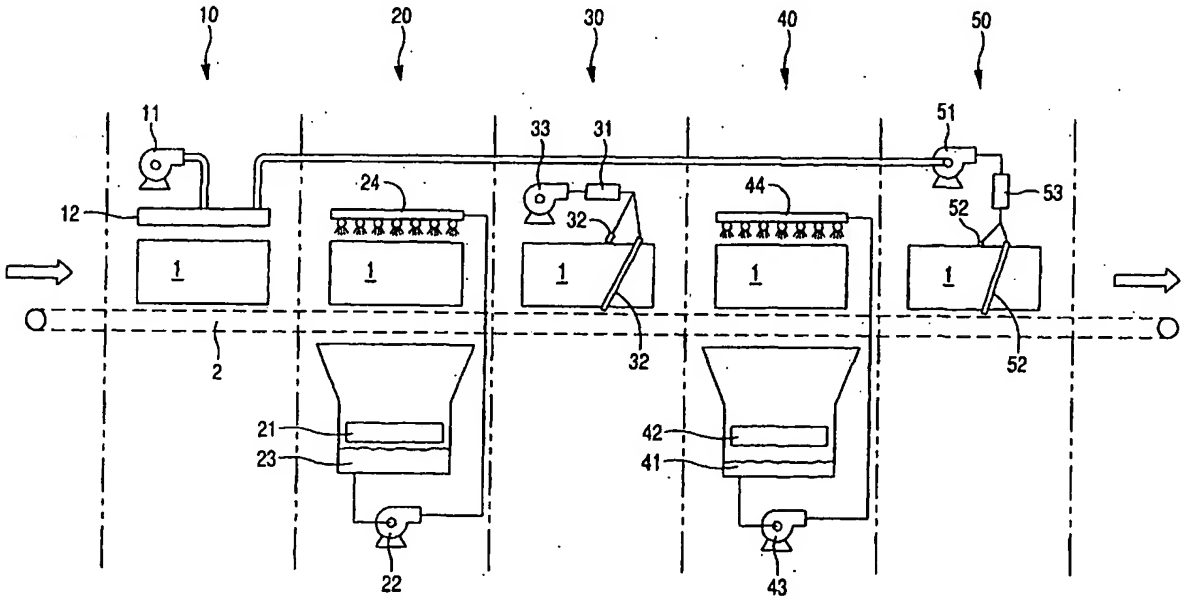
(54) Titre : SUBSTRAT IMPREGNE DE RESINE, METHODE DE FABRICATION ET SYSTEME OBTENU
(54) Title: RESIN-IMPREGNATED SUBSTRATE, METHOD OF MANUFACTURE AND SYSTEM THEREFOR



(57) Abrégé/Abstract:
The disclosed invention relates to polyisocyanate-impregnated lignocellulosic substrates having improved strength, water resistance and appearance, and also to methods and systems for producing such substrates. The polyisocyanate-impregnated lignocellulosic substrate are produced by impregnating a lignocellulosic substrate with an isocyanate resin, followed by polymerization of the isocyanate resin by applying a heated liquid to the impregnated substrate.

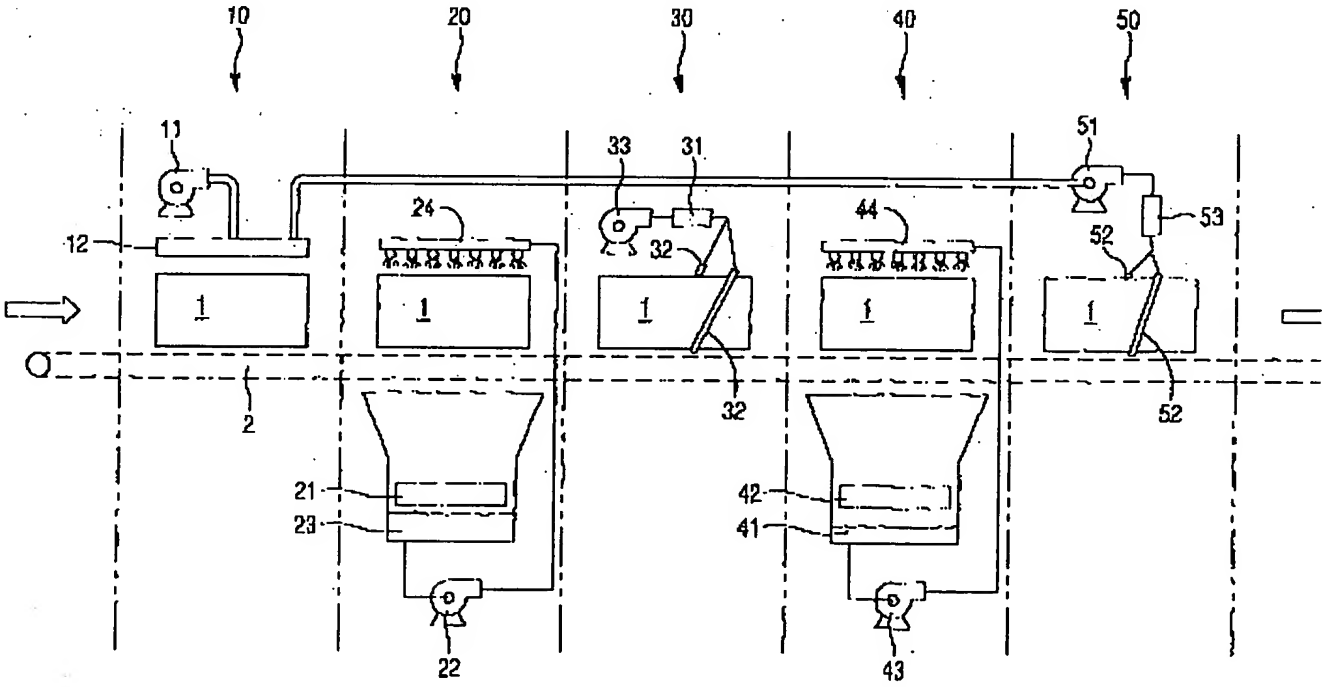
Canadian Patents Database

(12) **Patent Application:** (11) **CA 2437826**

(54) RESIN-IMPREGNATED SUBSTRATE, METHOD OF MANUFACTURE AND SYSTEM THEREFOR

(54) SUBSTRAT IMPREGNE DE RESINE, METHODE DE FABRICATION ET SYSTEME OBTI

Representative Drawing:



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ABSTRACT:

The disclosed invention relates to polyisocyanate-impregnated lignocellulosic substrates having improved

strength, water resistance and appearance, and also to methods and systems for producing such substrat The polyisocyanateimpregnated lignocellulosic substrate are produced by impregnating a lignocellulosic substrate with an isocyanate resin, followed by polymerization of the isocyanate resin by applying a heate liquid to the impregnated substrate.

CLAIMS: Show all claims

*** Note: Data on abstracts and claims is shown in the official language in which it was submitted.

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Important Notices

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Patent Document Number 2437826 :
RESIN-IMPREGNATED SUBSTRATE, METHOD OF MANUFACTURE AND SYSTEM THEREFOR

SUBSTRAT IMPREGNE DE RESINE, METHODE DE FABRICATION ET SYSTEME OBTENU

CLAIMS:

What we claim is:

1. A method for increasing the strength and water resistance of a substrate of a lignocellulosic material, comprising the steps of: impregnating a substrate of a lignocellulosic material with an isocyanate resin material; removing excess isocyanate resin material from the impregnated substrate by impinging air at a high flow rate upon the impregnated substrate; polymerizing the resin by applying a liquid to the impregnated substrate, the liquid being at a temperature sufficient for polymerization; and removing the liquid from the polymerized resin-impregnated substrate.

2. The method of claim 1, including the step of selecting an air knife system for providing the high flow rate of impinging air upon the impregnated substrate.

3. The method of claim 1, including the step of selecting the substrate from lignocellulosic fibers and binder.

4. The method of claim 3, including the step of selecting the binder from ureaformaldehyde resin or phenol-formaldehyde resin.

5. The method of claim 1, including the step of maintaining the liquid at a temperature greater than or equal to about 180° F.

6. The method of claim 1, including the step of maintaining the liquid at a temperature in the range of about 180° F to about 212° F.

7. The method of claim 1, including the step of maintaining the liquid at a temperature of about 180° F.

8. The method of claim 1, including the step of dehydrating the substrate in an oven before impregnation until a moisture content of less than about 7% by weight is achieved.

9. The method of claim 1, including the step of selecting water as the liquid.

10. The method of claim 1, wherein said applying is achieved by applying a plurality of streams of the liquid to the substrate of a lignocellulosic material.

11. The method of claim 1, including the step of maintaining the pressure of the isocyanate resin material impregnate at about 1 atmosphere.

12. The method of claim 1, including the step of maintaining the isocyanate resin material at a temperature of about 150° F.

13. The method of claim 1, including the step of selecting the isocyanate resin material from methylene diphenyl diisocyanate resin material.

14. The method of claim 1, including the step of selecting the isocyanate resin material from methylene diphenyl diisocyanate resin material, said methylene diphenyl diisocyanate resin material having a content of about 33% to about 49% of 4,4'methylene diphenyl diisocyanate, less than about 70% of poly(methylene diphenyl diisocyanate), less than about 10% of mixed methylene diphenyl diisocyanate isomers, and less than about 8% of 2,4'-methylene diphenyl diisocyanate.

15. The method of claim 1, further comprising the step of selecting the isocyanate resin material from those having an N=C=O content in a range of about 1% to about 33% by weight of the isocyanate resin material.

16. The method of claim 1, further comprising the step of selecting the isocyanate resin material from those having an N=C=O content of about 10% to about 33% by weight of the isocyanate resin material.

17. The method of claim 1, further comprising the step of selecting the isocyanate resin material from those having an N=C=O content of about 23% to about 32% by weight of the isocyanate resin material.

18. The method of claim 1, further comprising the step of selecting the isocyanate resin material from those having a -N=C=O functionality of about 2 to about 3.

19. The method of claim 1, further comprising the step of selecting the isocyanate resin from those having a viscosity at 25°C of about 50 to about 300 Centipoise.

20. The method of claim 1, further comprising the step of selecting the lignocellulosic material from either high density fiberboard, medium density fiberboard, oriented strand board, particle board, hemp, sisal, cotton stalk, wheat, straw, bamboo, jute, salt water reeds, palm fronds, flax, groundnut shells, hard woods, or soft woods.

21. The method of claim 1, further comprising the step of selecting the lignocellulosic material from medium density fiberboard.

22. An article having increased strength and water resistance, said article comprising a substrate of a lignocellulosic material impregnated with a polyisocyanate material, said article having a smooth, low-gloss surface, said substrate comprising a lignocellulosic material.

23. The article of claim 22, wherein said article is suitable for use as either a door skin, door stile, or door rail.

24. The article of claim 23, wherein said article further comprises drill holes suitable for inserting door hardware.

25. The article of claim 22, wherein said substrate of a lignocellulosic material is medium density fiberboard.

26. The article of claim 22, wherein said substrate of a lignocellulosic material comprises lignocellulosic fibers and binder.

27. The article of claim 26, wherein said binder is either urea-formaldehyde or phenol-formaldehyde. 29. The article of claim 22, wherein said polyisocyanate material is poly (methylene diphenyl diisocyanate). 30. A system for forming a polymerized resin-impregnated substrate, said system comprising: an impregnation station for impregnating a substrate of a lignocellulosic material with an isocyanate resin material, said impregnation station comprising a means for heating the isocyanate resin material and a means for applying the heated isocyanate resin material to the lignocellulosic substrate, said means for applying the heated isocyanate resin material is one of a first soaking tank and a plurality of nozzles; a resin material removal station for removing excess amounts of the isocyanate resin material from the isocyanate impregnated substrate before polymerization of the isocyanate resin material, said resin material removal station comprising an air knife station; a polymerization station for polymerizing the isocyanate resin material impregnated in the lignocellulosic material substrate, said polymerization station comprising a means for heating a liquid and a means for applying the heated liquid to the impregnated substrate, said means for applying the heated liquid is one of a second soaking tank and a plurality of nozzles. 31. The system of claim 30, further comprising a dehydration station for removing excess moisture form the lignocellulosic substrate, said dehydration station comprising a heater and a blower. 32. The system of claim 30, further comprising a liquid removal station for removing excess amounts of the liquid from the polymerized resin-impregnated substrate, said liquid removal station comprising an air knife station. 33. The system of claim 30, wherein the lignocellulosic substrate is medium density fiberboard. 34. A door having increased strength and water resistance, said door comprising: a door frame including first and second stiles that are oriented substantially parallel to one another, a top rail member, and a bottom rail member; and two door skins disposed on opposing sides of said door frame, wherein at least one of said door skins comprises a substrate of a lignocellulosic material impregnated with a polyisocyanate material, said at least one door skin having a smooth, non-glossy surface. 35. A method for increasing the strength and water resistance of a substrate of a lignocellulosic material, comprising the steps of: impregnating a substrate of a lignocellulosic material with an isocyanate resin material; polymerizing the resin by applying a liquid to the impregnated substrate, the liquid being at a temperature sufficient for polymerization; and removing the liquid from the polymerized resin-impregnated substrate.
